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FILE #: 02157/0202679-USD

DATE: 1/9/06

NUMBER TRANSMITTING TO: 571-273-0459

RECIPIENT: PCT Legal Office

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FROM: Flynn Barrison

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09 JAN 2006

Legal Staff
International Division

NO. OF PAGES TRANSMITTING
(INCLUDING COVER SHEET)*: 30

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8/22/05 Sylvia Williams
Date Sylvia Williams
Signature

Customer No.: 07278

Docket No.: 02157/0202679-US0

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Mamoru Usami et. al.

Serial No.: 10/528,518

Filed: March 18, 2005

For: ELECTRON BEAM IRRADIATION APPARATUS, ELECTRON BEAM IRRADIATION METHOD, AND APPARATUS FOR AND METHOD OF MANUFACTURING DISC-SHAPED OBJECT

REQUEST FOR CORRECTED FILING RECEIPT

RECEIVED

Commissioner of Patents and Trademarks
P.O. Box 1450
Alexandria, VA 22313-1450

1 09 JAN 2006

Legal Staff
International Division

Sir:

1. Attached is a copy of the official filing receipt received from the PTO in the above application for which issuance of a corrected filing receipt is respectfully requested.
2. There is an error with respect to the following data, which is:

☒ incorrectly entered
☐ omitted. and/or

{W:\02157\0202679us0\00506050.DOC [REDACTED]}

Error in

Correct data

- ☐ Applicant's name
- ☐ Applicant's address
- ☒ Title

**ELECTRON BEAM IRRADIATION APPARATUS,
ELECTRON BEAM IRRADIATION METHOD, AND
APPARATUS FOR AND METHOD OF
MANUFACTURING DISC-SHAPED OBJECT**

- ☐ Filing Date
- ☐ Application Number
- ☐ Foreign/PCT Application Re:
- ☐ Other

Remarks:

Enclosed please find a copy of the Executed Declaration and First Preliminary amendment.

The Commissioner is respectfully requested to issue a new and correct Filing Receipt.

Respectfully submitted,

Dated: August 22, 2005

2

Flynn Barrison
Reg. No. 53,970
Agent for Applicant(s)

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APPL NO.	FILING OR 371 (c) DATE	ART UNIT	FL FEE REC'D	ATTY. DOCKET NO	DRAWINGS	TOT CLMS	IND CLMS
10/528,518	03/18/2005	2055	4300	02157/0202679-US0	19	68	8

07278
DARBY & DARBY P.C.
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NEW YORK, NY 10150-5257

CONFIRMATION NO. 4313

FILING RECEIPT



OC000000018730118

Date Mailed: 08/12/2005

Receipt is acknowledged of this regular Patent Application. It will be considered in its order and you will be notified as to the results of the examination. Be sure to provide the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION when inquiring about this application. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. If an error is noted on this Filing Receipt, please mail to the Commissioner for Patents P.O. Box 1450 Alexandria Va 22313-1450. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections (if appropriate).

Applicant(s)

**Mamoru Usami, Tokyo, JAPAN;
Kazushi Tanaka, Tokyo, JAPAN;
Kenji Yoneyama, Tokyo, JAPAN;
Yukio Kaneko, Tokyo, JAPAN;
Takeshi Umega, Tokyo, JAPAN;**

Power of Attorney: The patent practitioners associated with Customer Number 07278.

Domestic Priority data as claimed by applicant

This application is a 371 of PCT/JP03/11890 09/18/2003

Foreign Applications

JAPAN 2002-274120 09/19/2002
JAPAN 2002-274121 09/19/2002

Projected Publication Date: 11/17/2005

Non-Publication Request: No

Early Publication Request: No

~~Signature~~ Law
~~Print Name~~ Law
~~Residential~~
~~Phone~~ Law
~~City~~
~~State~~ MS
~~Zip~~ 39201

Title

Electron beam irradiation device, electron beam irradiation method, disc-like body manufacturing method

Preliminary Class

369

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process simplifies the filing of patent applications on the same invention in member countries, but does not result in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

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Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at <http://www.uspto.gov/web/offices/pac/doc/general/index.html>.

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PTO/SB/106 (05-00)

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Declaration and Power of Attorney for Patent Application**特許出願宣言書及び委任状****Japanese Language Declaration****日本語宣言書**

私は、下記に記述された発明者として、ここに下記の通り宣言する：

As a below named inventor, I hereby declare that:

私の住所、郵便の宛先として同様は、私の氏名の後に記載された通りである。

My residence, post office address, and citizenship are as stated next to my name.

下記の名称の発明については、特許請求範囲に記載され、且つ特許が求められている発明主題に関して、私は、最初、最先且つ唯一の発明者である（唯一の発明者が記載されている場合）か、或いは最初、最先且つ共同発明者である（複数の発明者が記載されている場合）と信じている。

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

ELECTRON BEAM IRRADIATION APPARATUS,
ELECTRON BEAM IRRADIATION METHOD, AND
APPARATUS FOR AND METHOD OF
MANUFACTURING DISC-SHAPED OBJECT

上記発明の発明書はここに添付されているが、下記の欄がチェックされている場合は、この限りではない：

the specification of which is attached hereto unless the following box is checked:

☐の日に公開され、
この出願の発明出願番号またはPCT国際出願番号は、☐was filed on September 18, 2003
as United States Application Number or
PCT International Application Number

であり、且つ

PCT/JP2003/011890

and was amended on

の日に修正された発明（修正する場合）

(if applicable).

私は、上記の宣言書によって述べられた、特許請求範囲を含む上記発明書を検討し、且つ内容を理解していることをここに表明する。

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

私は、発明規則第37条第1.56に定義されている、特許性について重要な情報を開示する開示があることを認める。

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

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I hereby claim foreign priority under Title 35, United States Code Section 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365 (a) of any PCT International application which designated at least one country other than the United States listed below and have also identified below, by checking the box, any foreign application for patent, or inventor's certificate, or PCT International application having a filing date before that of the application for which priority is claimed.

Prior Foreign Application(s)

Priority Not Claimed

優先権を主張なし

外国での先行出願

JP2002-274120
(Number)
(番号)

JP
(Country)
(国名)

19/09/2002
(Day/Month/Year Filed)
(出願日/月/年)

☐

JP2002-274121
(Number)
(番号)

JP
(Country)
(国名)

19/09/2002
(Day/Month/Year Filed)
(出願日/月/年)

☐

私は、ここに、下記のいかなる米国仮特許出願についても、その米国法典第35条第118条(a)項の利益を主張する。

I hereby claim the benefit under Title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below.

(Application No.)
(出願番号)

(Filing Date)
(出願日)

(Application No.)
(出願番号)

(Filing Date)
(出願日)

私は、ここに、下記のいかなる米国出願についても、その米国法典第35条第120条に基づいて何れも主張し、又本区を指定するいかなるPCT国際出願についても、その同第365条(a)に基づいて利益を主張する。また、本出願の発明者証請求の範囲の主張が、米国法典第35条第112条第1項に規定された範囲で、発行する米国出願又はPCT国際出願に開示されていない場合においては、その発行出願の出願日と本国内出願日またはPCT国際出願日との間の期間中に入手された情報で、発明者証請求第37条第1項に規定された特許性に関わる重要な情報について開示範囲があることを認める。

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s), or 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application.

(Application No.)
(出願番号)

(Filing Date)
(出願日)

(Status Patented, Pending, Abandoned)
(出願：特許許可、係属中、放棄)

(Application No.)
(出願番号)

(Filing Date)
(出願日)

(Status Patented, Pending, Abandoned)
(出願：特許許可、係属中、放棄)

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(日本語宣言書)

委任状：私は本出願を審査する手続を行い、且つ米国特許庁との全ての業務を遂行するために、記名された発明者として、下記の弁護士及び/または特許士を任命する。(氏名及び登録番号を記載すること)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: (list name and registration number).

Practitioners associated with Customer Number 07278:

書類送付先

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New York, New York 10150-5257

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Peter C. Schechter, (212) 527-7723

Direct Telephone Calls to: (name and telephone number)

Peter C. Schechter (212) 527-7723

第一または第一発明者氏名	Full name of sole or first inventor Mamoru Usami
発明者の署名 日付	Inventor's signature Date Mamoru Usami Mar. 03, 2005
住所	Residence Chuo-ku, Tokyo, Japan
国籍	Citizenship Japan
郵便の宛先	Post Office Address (c/o) TDK Corporation 1-13-1, Nihonbashi, Chuo-ku, Tokyo, 103-8272, Japan

第二共同発明者がある場合、その氏名	Full name of second joint inventor, if any Kazushi Tanaka
第二共同発明者の署名 日付	Second inventor's signature Date Kazushi Tanaka Feb. 17, 2005
住所	Residence Chuo-ku, Tokyo, Japan
国籍	Citizenship Japan
郵便の宛先	Post Office Address (c/o) TDK Corporation 1-13-1, Nihonbashi, Chuo-ku, Tokyo, 103-8272, Japan

(第三以下の共同発明者についても同様に記載し、署名をすること)

(Supply similar information and signature for third and subsequent joint inventors.)

PTO/SB/106 (03-00)

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		Full name of third joint inventor, if any Kenji Yoneyama	
発明者の署名	日付	Inventor's signature	Date
		<i>Kenji Yoneyama</i>	<i>Feb. 17, 2005</i>
住所	Residence Chuo-ku, Tokyo, Japan		
国籍	Citizenship Japan		
郵便の宛先	Post Office Address (c/o) TDK Corporation 1-13-1, Nihonbashi, Chuo-ku, Tokyo, 103-8272, Japan		

		Full name of fourth joint inventor, if any Yukio Kaneko	
発明者の署名	日付	Inventor's signature	Date
		<i>Yukio Kaneko</i>	<i>Feb. 22, 2005</i>
住所	Residence Chuo-ku, Tokyo, Japan		
国籍	Citizenship Japan		
郵便の宛先	Post Office Address (c/o) TDK Corporation 1-13-1, Nihonbashi, Chuo-ku, Tokyo, 103-8272, Japan		

		Full name of fifth joint inventor, if any Takeshi Umea	
発明者の署名	日付	Inventor's signature	Date
		<i>Takeshi Umea</i>	<i>Feb. 17, 2005</i>
住所	Residence Chuo-ku, Tokyo, Japan		
国籍	Citizenship Japan		
郵便の宛先	Post Office Address (c/o) TDK Corporation 1-13-1, Nihonbashi, Chuo-ku, Tokyo, 103-8272, Japan		

		Full name of sixth joint inventor, if any	
発明者の署名	日付	Inventor's signature	Date
住所	Residence		
国籍	Citizenship		
郵便の宛先	Post Office Address		

Express Mail Label No. _____

Dated: _____

Docket No.: 02157/0202679-US0
(PATENT)**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**In re Patent Application of:
Mamoru Usami et al.

Application No.: Not Yet Assigned

Confirmation No.: N/A

Filed: Concurrently Herewith

Art Unit: N/A

For: **ELECTRON BEAM IRRADIATION
APPARATUS, ELECTRON BEAM
IRRADIATION METHOD, AND APPARATUS
FOR AND METHOD OF MANUFACTURING
DISC-SHAPED OBJECT (AS AMENDED)**

Examiner: Not Yet Assigned

FIRST PRELIMINARY AMENDMENTMS PCT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

INTRODUCTORY COMMENTS

Prior to examination on the merits, please amend the above-identified U.S. patent application as follows:

Amendments to the Specification begin on page 3 of this paper.

Amendments to the Claims are reflected in the listing of claims which begins on page 4 of this paper.

Amendments to the Abstract begin on page 19 of this paper.

Application No.: Not Yet Assigned

2

Docket No.: 02157/0202679-US0

Remarks/Arguments begin on page 20 of this paper.

Application No.: Not Yet Assigned

3

Docket No.: 02157/0202679-US0

AMENDMENTS TO THE SPECIFICATION

Please amend the title as follows:

ELECTRON BEAM IRRADIATION APPARATUS, ELECTRON BEAM IRRADIATION METHOD, AND APPARATUS FOR AND METHOD OF MANUFACTURING DISC-SHAPED OBJECT

Following the title, please insert the following paragraphs:

Cross-Reference to Prior Application

This is a U.S. National Phase application under 35 U.S.C. §371 of International Patent Application No. PCT/JP2003/011890, filed September 18, 2003, and claims the benefit of Japanese Patent Application Nos. 2002-274120, filed September 19, 2002 and 2002-274121, filed September 19, 2002, all of which are incorporated by reference herein. The International Application was published in Japanese on April 1, 2004 as WO 2004/027520 A1 under PCT Article 21(2).

Please replace the sub-title in page 31, line 5 with the following amended sub-title:

--Detailed Description of Best Mode for Carrying out the Invention--

Application No.: Not Yet Assigned

4

Docket No.: 02157/0202679-USO

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): An electron beam irradiation apparatus ~~characterized by~~ comprising:

- a rotary driving unit for rotationally driving an object to be rotated;
- a shield container for rotatably accommodating the object; and
- an electron beam irradiation unit provided in said shield container so that the surface of the object is irradiated with electron beams from an irradiation window thereof,

wherein the surface of the object is irradiated with the electron beams during its rotation from said irradiation window of said electron beam irradiation unit.

Claim 2 (original): An electron beam irradiation apparatus according to claim 1, wherein said electron beam irradiation unit emits the electron beams under a low acceleration voltage.

Claim 3 (currently amended): An electron beam irradiation apparatus according to claim 1 ~~or 2~~, wherein the acceleration voltage of said electron beam irradiation unit is 20 kV through 100 kV.

Claim 4 (currently amended): An electron beam irradiation apparatus according to ~~any one of claims~~ claim 1 through 3, wherein an interior of said shield container is set in an atmosphere of an inert gas, and

said shield container is provided with a gas introduction port and a gas discharge port from which the inert gas flows in the vicinity of said irradiation window.

Claim 5 (original): An electron beam irradiation apparatus according to claim 4, wherein a temperature sensor is provided in the vicinity of said irradiation window, and

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Application No.: Not Yet Assigned

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Docket No.: 02157/0202679-US0

a flow rate of the inert gas is adjusted based on a temperature measured by said temperature sensor.

Claim 6 (currently amended): An electron beam irradiation apparatus according to ~~any one of claims~~ claim 1 through 5, wherein an oxygen concentration meter for measuring an oxygen concentration within said shield container, is provided.

Claim 7 (currently amended): An electron beam irradiation apparatus according to ~~any one of claims~~ claim 1 through 6, wherein a vacuumizing device for depressurizing the interior of said shield container is provided.

Claim 8 (currently amended): An electron beam irradiation apparatus according to ~~any one of claims~~ claim 1 through 7, wherein the object has a disc shape, and
an area extending in at least one radial direction of the surface of the object is irradiated with the electron beams.

Claim 9 (currently amended): An electron beam irradiation apparatus according to ~~any one of claims~~ claim 1 through 8, wherein the object has a disc shape,
said electron beam irradiation unit includes a plurality of electron beam irradiation tubes,
and
each of said electron beam irradiation tubes irradiates each of a plurality of areas on the surface with the electron beams.

Claim 10 (currently amended): An electron beam irradiation apparatus according to ~~any one of claims~~ claim 1 through 8, wherein a shutter member is disposed between said irradiation window and the surface of the object, and

a shutter driving mechanism moves said shutter member between an opening position of permitting transmission of the electron beams emitted from said irradiation window and a closing position of blocking the electron beams, thus controlling switchover of the irradiation and non-

Application No.: Not Yet Assigned

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irradiation of the electron beams upon the surface of the object.

Claim 11 (original): An electron beam irradiation apparatus according to claim 10, wherein the switchover is conducted so that a quantity of emission of the electron beams is set large when said shutter member is in the opening position and set small when said shutter member is in the closing position,

Claim 12 (currently amended): An electron beam irradiation apparatus according to ~~any one of claims claim 1 through 11~~, wherein said shield container is openable and closable and is composed of a metallic material, and has a shielding structure for shielding the electron beams emitted from said irradiation window.

Claim 13 (currently amended): An electron beam irradiation method ~~characterized by comprising the steps of:~~

rotationally driving an object to be rotated accommodated in a shield container that can be air-tightly closed; and

irradiating the surface of said on-rotating object with the electron beams from an irradiation window of an electron beam irradiation unit.

Claim 14 (original): An electron beam irradiation method according to claim 13, wherein said electron beams irradiation unit emits the electron beams of which an acceleration voltage is 20 kV through 100 kV.

Claim 15 (currently amended): An electron beam irradiation method according to claim 13 ~~or 14, further comprising the steps of depressurizing wherein~~ an interior of said shield container is ~~depressurized and is thereafter replaced with~~ replacing in the interior an inert gas atmosphere by introducing an inert gas.

Claim 16 (currently amended): An electron beam irradiation method according to claim 15,

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further comprising the step of controlling wherein a flow rate of the inert gas is controlled while measuring an oxygen concentration within said shield container.

Claim 17 (currently amended): An electron beam irradiation method according to claim 15 ~~or 16~~, further comprising the step of flowing wherein the inert gas is flowed through the vicinity of said irradiation window toward a gas discharge port from a gas introduction port, thereby cooling off the vicinity of said irradiation window.

Claim 18 (currently amended): An electron beam irradiation method according to claim 17, further comprising the step of adjusting wherein a flow rate of the inert gas is adjusted based on a temperature measured by a temperature sensor provided in the vicinity of said irradiation window, thereby controlling a cooling temperature.

Claim 19 (currently amended): An electron beam irradiation method according to ~~any one of claims claim 13 through 18~~, wherein the object has a disc shape, and further comprising the step of irradiating on the surface an area, extending in at least one radial direction, on the surface is irradiated with the electron beams.

Claim 20 (currently amended): An electron beam irradiation method according to ~~any one claims claim 13 through 19~~, wherein the object has the disc shape, and further comprising the step of irradiating each of a plurality of areas with the electron beams with a plurality of electron beam irradiation tubes of said electron beam irradiation unit ~~irradiate each of a plurality of areas with the electron beams~~.

Claim 21 (currently amended): An electron beam irradiation method according to ~~any one claims claim 13 through 20~~, wherein further comprising the step of moving a shutter member disposed between said irradiation window and the surface of the object is moved between an opening position of permitting transmission of the electron beams emitted from said irradiation window and a closing position of blocking the electron beams, thus controlling switchover of the

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irradiation and non-irradiation of the electron beams upon the surface of the object.

Claim 22 (original): An electron beam irradiation method according to claim 21, wherein the switchover is conducted so that a quantity of emission of the electron beams is set large when said shutter member is in the opening position and set small when said shutter member is in the closing position.

Claim 23 (currently amended): An electron beam irradiation apparatus ~~characterized by~~ comprising:

a rotary driving unit for rotationally driving an object to be rotated;
a shield container for rotatably accommodating the object;
an electron beam irradiation unit provided in said shield container so that the surface of the object is irradiated with electron beams from an irradiation window thereof;
a shutter member disposed between said irradiation window and the surface of the object and movable between an opening position of permitting transmission of the electron beams emitted from said irradiation window and a closing position of blocking the electron beams; and
a shutter driving mechanism for moving said shutter member so as to effect switchover to the irradiation and non-irradiation of the electron beams during a rotation of the object, wherein the object has a disc shape, and an area, extending in a radial direction, on the surface is irradiated with the electron beams from said irradiation window.

Claim 24 (original): An electron beam irradiation apparatus according to claim 23, wherein said electron beam irradiation unit includes a plurality of electron beam irradiation tubes disposed in the radial direction on the surface.

Claim 25 (original): An electron beam irradiation apparatus according to claim 24, wherein said plurality of electron beam irradiation tubes are so arranged as to substantially uniformize a distribution of irradiation beam intensities of the electron beams in the radial direction.

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Claim 26 (original): An electron beam irradiation apparatus according to claim 25, wherein a period of electron beam irradiation time is controlled corresponding to a radial position of the object so as to substantially equalize an integrated irradiation dose of the electron beam irradiation in the radial direction.

Claim 27 (currently amended): An electron beam irradiation apparatus according to claim 25 ~~or 26~~, wherein said shutter member is constructed to start, when opened, opening in an outer peripheral position and to gradually open toward an inner peripheral position on the surface of the object.

Claim 28 (currently amended): An electron beam irradiation apparatus according to ~~any one of claims claim 25 through 27~~, wherein an aperture is formed extending in the radial direction,

the switchover to the irradiation and the non-irradiation of the electron beams is performed by opening and closing said aperture through a movement of said shutter member, and

the electron beam irradiation time is controlled corresponding to the radial position of the object, depending on a relative position between said shutter member and said aperture and on a moving speed of said shutter member.

Claim 29 (original): An electron beam irradiation apparatus according to claim 24, wherein said plurality of electron beam irradiation tubes are arranged to obtain such a distribution that an irradiation beam intensity of the electron beams is high on the outer peripheral side but low on the inner peripheral side in the radial direction.

Claim 30 (original): An electron beam irradiation apparatus according to claim 29, wherein said shutter member is constructed to open and close at a comparatively higher speed than a rotating speed of the object.

Claim 31 (currently amended): An electron beam irradiation apparatus according to ~~any one of claims claim 1 through 27, 29 and~~ 30, wherein an aperture is formed extending in the radial

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direction, and

the switchover to the irradiation and the non-irradiation of the electron beams is performed by opening and closing said aperture through a movement of said shutter member.

Claim 32 (currently amended): An electron beam irradiation method ~~characterized by~~ comprising the steps of:

~~a step of~~ rotationally driving an object to be rotated accommodated in a shield container that can be air-tightly closed;

~~a step of~~ irradiating the surface of said on-rotating object with the electron beams from an irradiation window by moving a shutter member provided between the surface of the object and said irradiation window of an electron beam irradiation unit; and

~~a step of~~ stopping the irradiation of the electron beams by blocking the electron beams in a way that moves said shutter member after the irradiation of the electron beams for a predetermined period of time.

Claim 33 (original): An electron beam irradiation method according to claim 32, wherein said electron beams irradiation unit has an acceleration voltage ranging from 20 kV to 100 kV.

Claim 34 (currently amended): An electron beam irradiation method according to claim 32 ~~or 33, wherein~~ further comprising the steps of depressurizing an interior of said shield container is depressurized and is thereafter replaced with replacing in the interior an inert gas atmosphere by introducing an inert gas.

Claim 35 (currently amended): An electron beam irradiation method according to claim 34, ~~wherein~~ further comprising the step of flowing the inert gas is flowed through the vicinity of said irradiation window toward a gas discharge port from a gas introduction port, thereby cooling off the vicinity of said irradiation window.

Claim 36 (currently amended): An electron beam irradiation method according to ~~any one~~

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~~of claims claim 32 through 35, wherein the object has a disc shape, and further comprising the step of irradiating with the electron beams from said irradiation window an area, extending in a radial direction, on the surface is irradiated with the electron beams from said irradiation window.~~

Claim 37 (original): An electron beam irradiation method according to claim 36, wherein the irradiation of the electron beams is effected by a plurality of electron beam irradiation tubes, serving as said electron beam irradiation unit, arranged in the radial direction of the surface.

Claim 38 (currently amended): An electron beam irradiation method according to claim 37, ~~wherein further comprising the steps of arranging said plurality of electron beam irradiation tubes are so arranged as~~ to substantially uniformize a distribution of irradiation beam intensities of the electron beams in the radial direction, and

~~controlling a period of electron beam irradiation time is controlled~~ corresponding to a radial position of the object so as to substantially uniformize a distribution of an integrated irradiation dose of the electron beam irradiation in the radial direction.

Claim 39 (original): An electron beam irradiation method according to claim 38, wherein said shutter member starts opening in an outer peripheral position and gradually opens toward an inner peripheral position on the surface of the object, thereby controlling the electron beam irradiation time.

Claim 40 (currently amended): An electron beam irradiation method according to claim 37, ~~wherein further comprising the step of arranging said plurality of electron beam irradiation tubes are arranged~~ to obtain such a distribution that an irradiation beam intensity of the electron beams is high on the outer peripheral side but low on the inner peripheral side in the radial direction.

Claim 41 (currently amended): An electron beam irradiation method according to claim 40, ~~wherein further comprising the steps of opening and closing said shutter member is opened and closed~~ at a comparatively higher speed than a rotating speed of the object.

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Claim 42 (currently amended): An apparatus for manufacturing a disc-shaped object, comprising an electron beam irradiation apparatus according to ~~any one of claims claim 1 through 12 and claims 23 through 31,~~

wherein at least one of~~characterized in that~~ a resin layer and/or a surface layer formed on the object serving as a disc-shaped object is cured by the irradiation of the electron beams.

Claim 43 (currently amended): A method of manufacturing a disc-shaped object, involving the use of ~~an electron beam irradiation apparatus according to any one of claims 1 through 12 and claims 23 through 31, or an electron beam irradiation method according to any one of claims claim 13 through 22 and claims 32 through 41,~~

characterized in that further comprising the steps of forming at least one of a resin layer and/or a surface layer formed on the object serving as a disc-shaped object; and curing the layer is cured by the irradiation of the electron beams.

Claim 44 (original): An apparatus for manufacturing a disc-shaped object, characterized by comprising:

an air-tightly closable chamber including: an electron beam irradiation apparatus having a first rotational unit provided in an openable/closable shield container and accommodating a disc-shaped object, and an electron beam irradiation unit irradiating the surface of the disc-shaped object with electron beams from its irradiation window; and an exchange chamber having a second rotational unit capable of accommodating the disc-shaped object and air-tightly closable and openable/closable independently of said shield container; and

a rotary unit for exchanging said first rotational unit in said shield container and said second rotational unit in said exchange chamber with each other by rotating said first rotational unit and said second rotational unit.

Claim 45 (original): An apparatus for manufacturing a disc-shaped object, characterized by comprising:

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an air-tightly closable chamber including: an electron beam irradiation apparatus having a first rotational unit provided in an openable/closable shield container and accommodating and rotationally driving a disc-shaped object, and an electron beam irradiation unit irradiating the surface of said on-rotating disc-shaped object with electron beams from its irradiation window; and an exchange chamber having a second rotational unit capable of accommodating the disc-shaped object and air-tightly closable and openable/closable independently of said shield container; and

a rotary unit for exchanging said first rotational unit in said shield container and said second rotational unit in said exchange chamber with each other by rotating said first rotational unit and said second rotational unit.

Claim 46 (currently amended): An apparatus for manufacturing a disc-shaped object according to claim 44 ~~or 45~~, wherein said electron beam irradiation unit emits the electron beams of which an acceleration voltage is 20 kV through 100 kV.

Claim 47 (currently amended): An apparatus for manufacturing a disc-shaped object according to claim 44, ~~45 or 46~~, wherein the surface of the disc-shaped object moving into said shield container by rotating said second rotational unit in said exchange chamber, is irradiated with the electron beams emitted from said electron beam irradiation unit, and said first rotational unit, accommodating the disc-shaped object after being irradiated with the electron beams, in said shield container is rotated and thus transferred into said exchange chamber.

Claim 48 (currently amended): An apparatus for manufacturing a disc-shaped object according to ~~any one of claims~~ claim 44 through 47, wherein said shield container includes a fixed unit forming a first air-tightly closed space in cooperation with said first or second rotational unit and provided with said electron beam irradiation unit, said exchange chamber includes a third rotational unit forming a second air-tightly closed space in cooperation with said second or first rotational unit and capable of attaching and detaching the disc-shaped object,

in a state where said chamber is air-tightly closed, said first rotational unit moves to and

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from said fixed unit, and said second rotational unit moves to and from said third rotational unit, thereby exchanging the disc-shaped object,

said third rotational unit opens the second air-tightly closed space and rotates while holding the disc-shaped object, thereby ejecting the post-irradiation disc-shaped object, and

a different fourth rotational unit rotates toward said second rotational unit and exchanges the pre-irradiation disc shaped object in a way that supplies the disc-shaped object to said second rotational unit.

Claim 49 (original): An apparatus for manufacturing a disc-shaped object according to claim 48, wherein said electron beam irradiation unit irradiates the electron beams within said first air-tightly closed space during the exchange of the disc-shaped object by said third and fourth rotational units.

Claim 50 (currently amended): An apparatus for manufacturing a disc-shaped object according to ~~any one of claims claim 44 through 49~~, wherein a shutter member disposed between said irradiation window of said electron beam irradiation unit and the surface of the disc-shaped object and is moved by a shutter driving mechanism between an opening position of permitting transmission of the electron beams emitted from said irradiation window and a closing position of blocking the electron beams, thereby controlling switchover to the irradiation and non-irradiation of the electron beams upon the surface of the disc-shaped object.

Claim 51 (currently amended): An apparatus for manufacturing a disc-shaped object according to ~~any one of claims claim 44 through 50~~, wherein an interior of said exchange chamber is depressurized and is thereafter replaced with an inert gas atmosphere.

Claim 52 (currently amended): An apparatus for manufacturing a disc-shaped object according to ~~any one of claims claim 44 through 51~~, wherein the inert gas flows in the vicinity of said irradiation window, thereby cooling off said irradiation window.

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Claim 53 (currently amended): An apparatus for manufacturing a disc-shaped object according to ~~any one of claims~~ claim 44 through 52, wherein said shield container is composed of a metallic material, and

a shielding portion for shielding the electron beams is provided at an abutting portion between said first rotational unit and said fixed unit.

Claim 54 (original): A method of manufacturing a disc-shaped object, ~~characterized by comprising the steps of:~~

~~a step of irradiating the surface of a disc-shaped object accommodated in a rotational unit within an air-tightly closed space with electron beams of which an acceleration voltage is 20 kV through 100 kV; and~~

~~a step of opening the air-tightly closed space, rotating said rotational unit and, in linkage with this operation, rotating a different rotational unit accommodating another disc-shaped object, thereby exchanging the post-irradiation disc-shaped object with the pre-irradiation disc-shaped object.~~

Claim 55 (currently amended): A method of manufacturing a disc-shaped object, ~~characterized by comprising the steps of:~~

~~a step of irradiating the surface of an on-rotating disc-shaped object while rotationally driving the disc-shaped object accommodated in a rotational unit within an air-tightly closed space with electron beams of which an acceleration voltage is 20 kV through 100 kV; and~~

~~a step of opening the air-tightly closed space, rotating said rotational unit and, in linkage with this operation, rotating a different rotational unit accommodating another disc-shaped object, thereby exchanging the post-irradiation disc-shaped object with the pre-irradiation disc-shaped object.~~

Claim 56 (currently amended): A method of manufacturing a disc-shaped object according to claim 54 ~~or 55~~, further comprising a step of forming at least one of a resin layer and/or a surface layer on the pre-irradiation disc-shaped object, wherein at least one of the resin layer and/or the surface layer is cured by the irradiation of the electron beams.

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Claim 57 (new): An electron beam irradiation apparatus according to claim 13, wherein an aperture is formed extending in the radial direction, and

the switchover to the irradiation and the non-irradiation of the electron beams is performed by opening and closing said aperture through a movement of said shutter member.

Claim 58 (new): An electron beam irradiation apparatus according to claim 23, wherein an aperture is formed extending in the radial direction, and

the switchover to the irradiation and the non-irradiation of the electron beams is performed by opening and closing said aperture through a movement of said shutter member.

Claim 59 (new): An apparatus for manufacturing a disc-shaped object, comprising an electron beam irradiation apparatus according to claim 23;

wherein at least one of a resin layer and a surface layer formed on the object serving as a disc-shaped object is cured by the irradiation of the electron beams.

Claim 60 (new): A method of manufacturing a disc-shaped object, involving the use an electron beam irradiation method according to claim 32,

further comprising the steps of forming at least one of a resin layer and a surface layer on the object serving as a disc-shaped object; and curing by the irradiation of the electron beams.

Claim 61 (new): An apparatus for manufacturing a disc-shaped object according to claim 45, wherein said electron beam irradiation unit emits the electron beams of which an acceleration voltage is 20 kV through 100 kV.

Claim 62 (new): An apparatus for manufacturing a disc-shaped object according to claim 45, wherein the surface of the disc-shaped object moving into said shield container by rotating said second rotational unit in said exchange chamber, is irradiated with the electron beams emitted from said electron beam irradiation unit, and

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said first rotational unit, accommodating the disc-shaped object after being irradiated with the electron beams, in said shield container is rotated and thus transferred into said exchange chamber.

Claim 63 (new): An apparatus for manufacturing a disc-shaped object according to claim 45, wherein said shield container includes a fixed unit forming a first air-tightly closed space in cooperation with said first or second rotational unit and provided with said electron beam irradiation unit,

said exchange chamber includes a third rotational unit forming a second air-tightly closed space in cooperation with said second or first rotational unit and capable of attaching and detaching the disc-shaped object,

in a state where said chamber is air-tightly closed, said first rotational unit moves to and from said fixed unit, and said second rotational unit moves to and from said third rotational unit, thereby exchanging the disc-shaped object,

said third rotational unit opens the second air-tightly closed space and rotates while holding the disc-shaped object, thereby ejecting the post-irradiation disc-shaped object, and

a different fourth rotational unit rotates toward said second rotational unit and exchanges the pre-irradiation disc shaped object in a way that supplies the disc-shaped object to said second rotational unit.

Claim 64 (new): An apparatus for manufacturing a disc-shaped object according to claim 45, wherein a shutter member disposed between said irradiation window of said electron beam irradiation unit and the surface of the disc-shaped object and is moved by a shutter driving mechanism between an opening position of permitting transmission of the electron beams emitted from said irradiation window and a closing position of blocking the electron beams, thereby controlling switchover to the irradiation and non-irradiation of the electron beams upon the surface of the disc-shaped object.

Claim 65 (new): An apparatus for manufacturing a disc-shaped object according to claim 45, wherein an interior of said exchange chamber is depressurized and is thereafter replaced with an

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inert gas atmosphere.

Claim 66 (new): An apparatus for manufacturing a disc-shaped object according to claim 45, wherein the inert gas flows in the vicinity of said irradiation window, thereby cooling off said irradiation window.

Claim 67 (new): An apparatus for manufacturing a disc-shaped object according to claim 45, wherein said shield container is composed of a metallic material, and

a shielding portion for shielding the electron beams is provided at an abutting portion between said first rotational unit and said fixed unit.

Claim 68 (new): A method of manufacturing a disc-shaped object according to claim 55, further comprising a step of forming at least one of a resin layer and a surface layer on the pre-irradiation disc-shaped object,

wherein at least one of the resin layer and the surface layer is cured by the irradiation of the electron beams.

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AMENDMENTS TO THE ABSTRACT

Please substitute the following paragraph(s) for the abstract now appearing in the currently filed specification:

--An electron beam irradiation apparatus and method capable of easily curing at least part of a surface layer and/or a resin layer composed of materials that are hard to be cured by irradiation of ultraviolet rays. A disc-shaped object manufacturing apparatus and method capable of efficiently forming, on the disc-shaped object, at least part of a surface layer and/or a resin layer such as light transmitting layer, etc. thereunder. An electron beam irradiation apparatus comprises a rotary driving unit for rotationally driving an object, a shield container rotatably accommodating the object, and an electron beam irradiation unit provided in the shield container so that the surface of the object is irradiated with electron beams from an irradiation window thereof, wherein the surface of the object is irradiated with the electron beams during its rotation from the irradiation window of the electron beam irradiation unit. The surface of the on-rotating object can be thereby irradiated with the electron beams having larger energy than the ultraviolet rays have.--

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REMARKS:

The title has been amended to be in conformance with the translation of the International Application.

The specification has been amended in accordance with 37 CFR §1.78 to make reference to the International Application from which this application originates and to incorporate by reference the Japanese priority applications.

Claims 1, 13, 16, 18, 23, 32, 35, 38, 40-41, 55 have been amended to conform to U.S. practice. No new matter is added by this amendment.

Claims 2, 4, 6-10, 12, 15, 17, 19-21, 27-28, 31, 34, 36, 42-43, 46-48, 50-53, 56 have been amended to remove multiple dependencies. Claims 57-68 have been added to restore the subject matter claimed in these claims that was removed as a result of the amendment. The amendment is made to reduce filing fees and not for any other reason related to patentability of such claim. No new matter is added by this amendment.

Abstract has been amended to conform to U.S. practice. No new matter is added by this amendment.

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Dated: March 17, 2005

Respectfully submitted,

By 

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